

an "infinitesimal linear operator." Kolmogoroff (*Mathematische Annalen*, vols. 104, 108) had previously, but in less suggestive language, correlated such families of operators with infinitesimal differential operators; technically, the reviewer prefers Kolmogoroff's treatment.

The reviewer also feels that Hostinsky could have used with profit the modern theory of function spaces (von Neumann, Stone, Banach). Again, von Neumann's theory of groups of linear transformations, and Schlesinger's Lebesgue integration of matrices, might well have been sketched—and a reference to Delsarte's work is really called for.

But these defects do not prevent the book from being of the first importance—in fact, probably the best available introduction to the higher theory of linear differential equations.

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*Économique Rationnelle.* By Guillaume and Ed. Guillaume. (*Actualités Scientifiques et Industrielles*, nos. 504–508.) Paris, Hermann, 1937. 375 pp.

*An Econometric Approach to Business Cycle Problems.* By J. Tinbergen. (*Actualités Scientifiques et Industrielles*, no. 525.) Paris, Hermann, 1937. 73 pp.

The great increase of the last few years in statistical material relating to the phenomena of economics has brought realization that the "laws of economics" must be subjected to new scrutiny. In some cases they must be modified, in others reformulated with the introduction of new variables. In this modern adventure, to which the name of econometrics has been generically given, mathematics plays its customary central role. Although the origin of mathematical economics antedates the publication in 1838 of A. A. Cournot's classic *Theory of Riches*, which ushered in the justly celebrated works of Jevons, Walras, Marshall, Edgeworth, Pareto, and others of the mathematical school, econometrics in the modern sense is a new science. The books before us for review indicate the trend that modern studies are taking.

The first volume is divided into five parts: (1) Method, (2) Pure economy, (3) Pure economy in interference with the legal domain, (4) The national legal-economic domain in interference with external society, (5) Mathematical models of the economic world.

It is the last part which will be of the most interest to mathematicians, since the authors attempt to establish mathematical models for the interpretation of economic phenomena. Their point of view is taken from dynamics. The authors set up equations which represent for them "the principle of the conservation of the flux of commodities." They introduce the notion of "money liquidity" in a theory of "kinetic and potential money." Economic equilibrium conditions are formulated in terms of the differential variation in commodities. Intriguing new units are employed such as the gold-gram as a quantity of value, the gold-gram/sec. as the flux of value, the gold-gram/man-sec. as the density of flux.

The fundamental tenet of the authors is found in the statement: "We shall see that in attempting to create a *rational economics* similar to a body of doctrine such as rational mechanics, we are led similarly to search for some principle of conservation, more particularly the axiom which we shall call the 'principle of the conservation of value.' "

The prefatory material is elegantly expressed and contains much of interest to the philosophy of science. Bridgman's operational theory is regarded as an essential viewpoint for the new methods. Thus, in criticising the subjective theories of the older economists, the authors remark: "Unfortunately, their efforts have remained